

# Human Health and Recreational Indicators

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# Why Include in Survey?

- Direct and indirect links to human health
- Pathogens
  - Enterococci (*an indicator of pathogens*)
  - Contact via swimming, boating, water sports
- Fish tissue
  - Consumption of recreationally-caught fish
- Aesthetics?



# ***Enterococci***

- Good indicator of pathogens in both fresh & marine waters
- Shows a moderate correlation to swimming-associated gastroenteritis
- *E. coli* good indicator in fresh water



# Why Not Fecal Coliform?

- Prior to 1986 this was the recommended indicator organism
- Epidemiological studies showed no correlation with swimming- associated gastroenteritis
- Fecal coliform group includes not only *E. coli*, but others present in soils or decomposing organic matter such as leaves/wood
  - *Klebsiella* – present in pulp/paper/textile mill effluents)



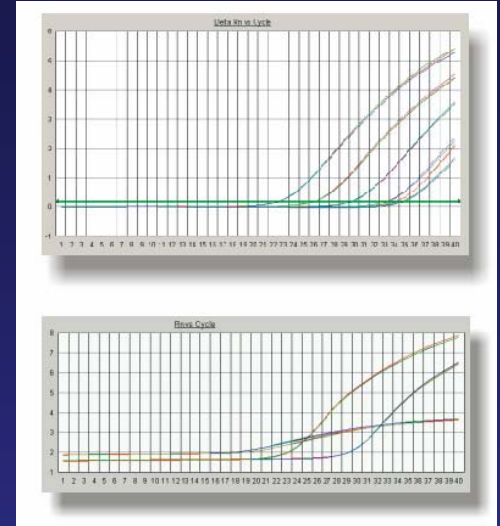
# Pathogen (*Enterococci*) Sampling for Lakes

- Sampled offshore of the final physical habitat station
- Collected in 1-L pre-sterilized, polypropylene bottles at appropriate sampling depth (6-12 inches below water surface)
- Samples will be filtered and frozen within 6 hours of collection



# Enterococci Processing and Analysis

- Samples processed and analyzed using methods developed by the U.S. EPA National Exposure Research Laboratory (NERL)
- Analyzed using a Quantitative Polymerase Chain Reaction (QPCR) method
  - a genetic method that quantifies a DNA target via a fluorescently tagged probe



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# Fish Tissue



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# -Options-

- Wildlife Exposure
  - Whole fish
    - Species and size representative of what is commonly consumed by wildlife
      - Short lived – recent exposure
      - Long lived – longer term exposure
- Human Exposure
  - Fillet
    - Species and size targeted by humans for consumption





# -Options-

- Endocrine Disrupting Chemicals (EDCs)
  - Requires fish be sexed
    - Problematic to do in the field on a national scale
  - Genetic markers to sex fish have not been developed
  - Sample type collected
    - Field dissection – (time and expertise issue)
    - Whole fish collected and dissected in the laboratory
- Pharmaceuticals, Personal Care Products (PCPP's)



# Logistical Considerations

- All will require the development of regionally/resource adjusted targeted species list
- Requires that samples be kept chilled in the field and later frozen

